

What is claimed is

1. A nuclear fuel body comprising fuel grains and tungsten network.
- 5 2. The nuclear fuel body as set forth in claim 1, wherein the tungsten network is continuously formed between the fuel grains.
- 10 3. The nuclear fuel body as set forth in claim 1, wherein the tungsten network envelops the fuel grains.
- 15 4. The nuclear fuel body as set forth in claim 1, wherein the one unit constituting the tungsten network has a size ranging from 5  $\mu\text{m}$  to 500  $\mu\text{m}$ , and the tungsten channel between two neighboring fuel grains has a thickness ranging from 0.1  $\mu\text{m}$  to 20  $\mu\text{m}$ .
- 20 5. The nuclear fuel body as set forth in claim 1, wherein the amount of tungsten is between 0.2 and 50% by weight of the nuclear fuel body.
- 25 6. The nuclear fuel body as set forth in claim 1, wherein the nuclear fuel material is uranium oxide or uranium oxide mixture, prepared by mixing one

selected from a group consisting of plutonium oxide, thorium oxide and gadolinium oxide with uranium oxide.

5     7. The nuclear fuel body as set forth in claim 1, wherein the tungsten is pure tungsten and further includes other metals up to 10% by weight of tungsten.

10    8. The nuclear fuel body as set forth in claim 1, wherein the tungsten network is formed through the entire fuel body or within local regions.

15    9. The nuclear fuel body as set forth in claim 1, wherein the tungsten network is formed in one region of inner cylinder and outside ring regions in the fuel body.

20    10. A preparation method of the nuclear fuel body comprising the following steps:

- (1) Preparing a green body composed of nuclear fuel powder and tungsten-containing powder (Step 1);
- 25    (2) Preparing a preliminary sintered body, in which tungsten particles are dispersed, by heating the above green body in a reducing gas

(Step 2);

(3) Forming liquid tungsten oxide network in the preliminary sintered body by heating in an oxidizing gas (Step 3); and

5 (4) Preparing a nuclear fuel body comprising solid tungsten network by heating in a reducing gas the above preliminary sintered body having a liquid tungsten oxide network (Step 4).

10 11. The preparation method of the nuclear fuel body as set forth in claim 10, wherein the step 1 further includes preparing a powder mixture by mixing fuel powder and tungsten-containing powder, and making a green body by loading and pressing the powder  
15 mixture in a mold.

12. The preparation method of the nuclear fuel body as set forth in claim 10, wherein the step 1 further includes loading the tungsten-containing powder in  
20 the center and the fuel powder in the surroundings, and pressing to make a green body.

13. The preparation method of the nuclear fuel body as set forth in claim 10, wherein the green body is  
25 prepared by loading and pressing the fuel powder only and then putting the tungsten-containing

powder, confined by a cap, on the surface of the green body in step 1, and the preliminary sintered body where tungsten particles adhere to the surface is prepared by heating the green body in a reducing gas in step 2.

14. The preparation method of the nuclear fuel body as set forth in claim 10, wherein the heating temperature of step 2 is 1100~2000°C.

15. The preparation method of the nuclear fuel body as set forth in claim 10, wherein the reducing gas is hydrogen and further includes one selected from a group consisting of nitrogen, inert gas, carbon dioxide, carbon monoxide, steam and mixtures thereof.

16. The preparation method of the nuclear fuel body as set forth in claim 10, wherein the heating temperature of step 3 is 1100~1800°C.

17. The preparation method of the nuclear fuel body as set forth in claim 10, wherein the oxidizing gas is one selected from a group consisting of carbon dioxide, steam and a mixed gas selected from a group consisting of a mixed gas of carbon dioxide

and carbon monoxide, a mixed gas of hydrogen and steam, a mixed gas of hydrogen and carbon dioxide, a mixed gas of inert gas and oxygen, and a mixed gas of nitrogen and oxygen.

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18. The preparation method of the nuclear fuel body as set forth in claim 10, wherein the heating temperature of step 4 is 1100~2000°C.

10 19. The preparation method of the nuclear fuel body as set forth in claim 10, wherein the nuclear fuel powder is uranium oxide or the mixture prepared by mixing uranium oxide and one or more selected from a group consisting of plutonium oxide, thorium  
15 oxide and gadolinium oxide.

20. The preparation method of the nuclear fuel body as set forth in claim 10, wherein the tungsten-containing powder is one selected from the group  
20 consisting of tungsten powder, tungsten oxide powder and mixtures thereof.

21. The preparation method of the nuclear fuel body as set forth in claim 10, wherein the step 1 further  
25 includes preparing a powder mixture by mixing fuel powder and tungsten-containing powder, loading the

powder mixture in the inner cylinder void of a mold and the fuel powder only in the outside ring void, and making a green body by pressing the powders in a mold.

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22. The preparation method of the nuclear fuel body as set forth in claim 10, wherein the amount of the tungsten-containing powder is between 0.2 and 50% by weight of the green body.

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